FIG. 1

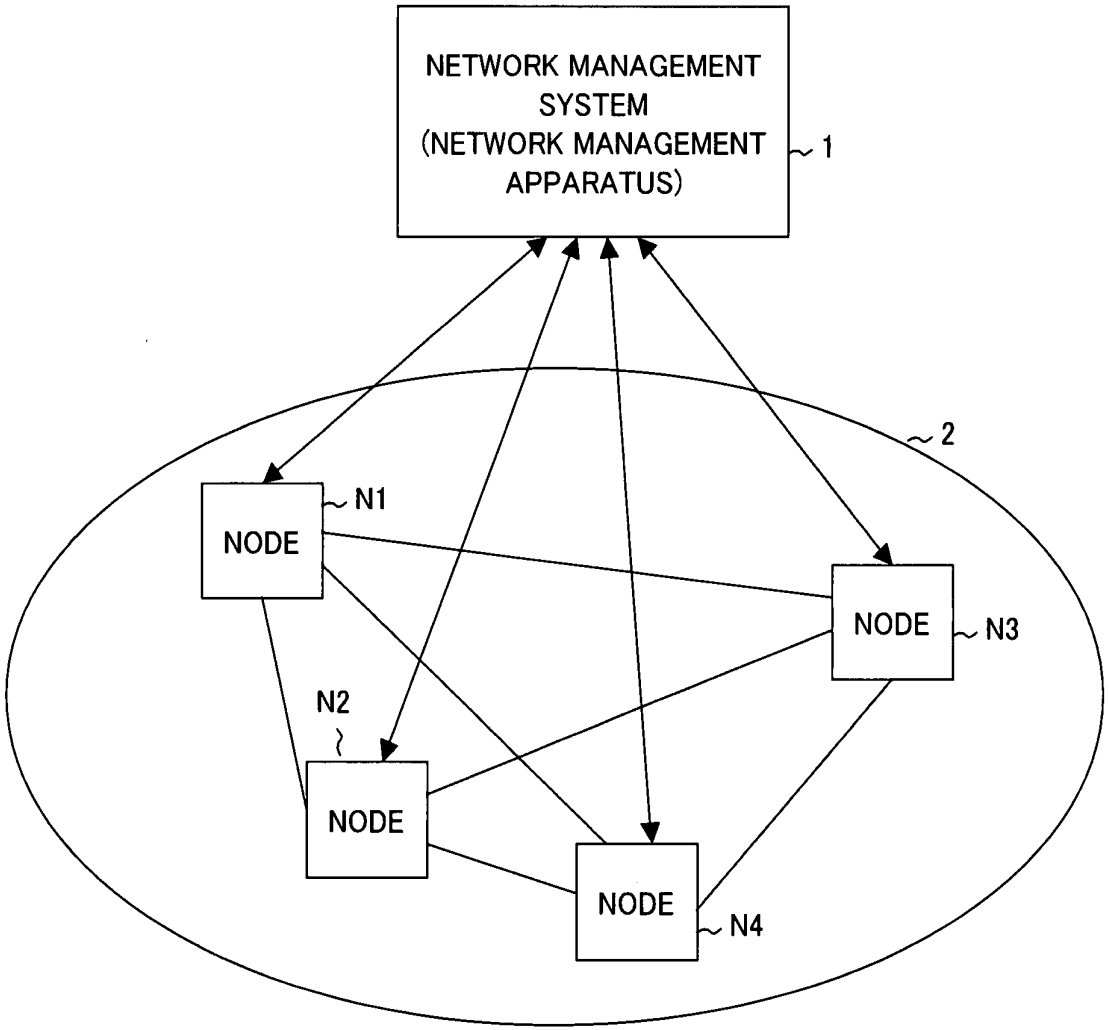
NETWORK MANAGEMENT SYSTEM (NETWORK MANAGEMENT APPARATUS)
1
2
NODE
N1
NODE
N3
N2
NODE
NODE
N4

FIG. 2

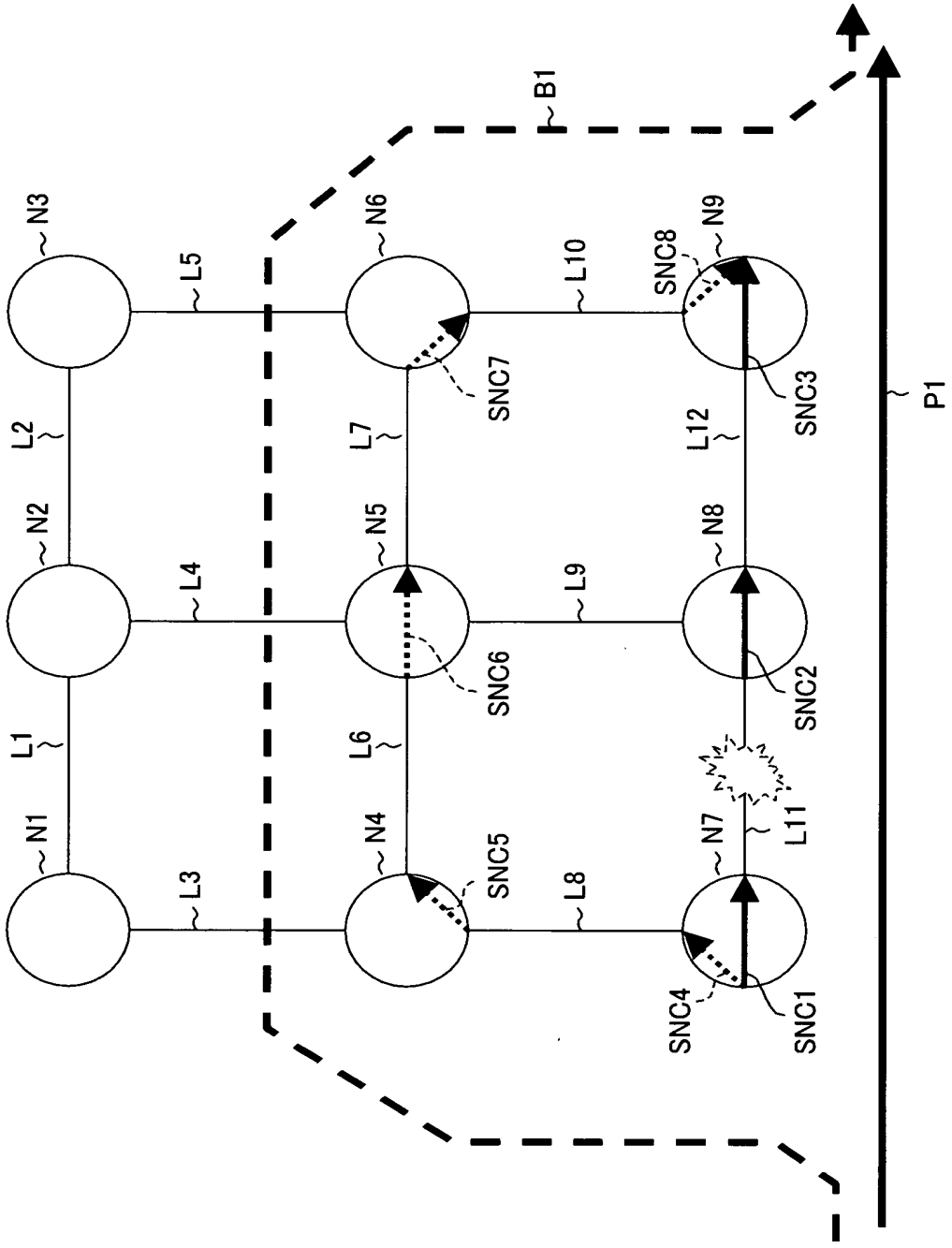
B1
P1
N1
N2
N3
N4
N5
N6
N7
N8
N9
L1
L2
L3
L4
L5
L6
L7
L8
L9
L10
L11
L12
SNC1
SNC2
SNC3
SNC4
SNC5
SNC6
SNC7
SNC8

FIG. 3

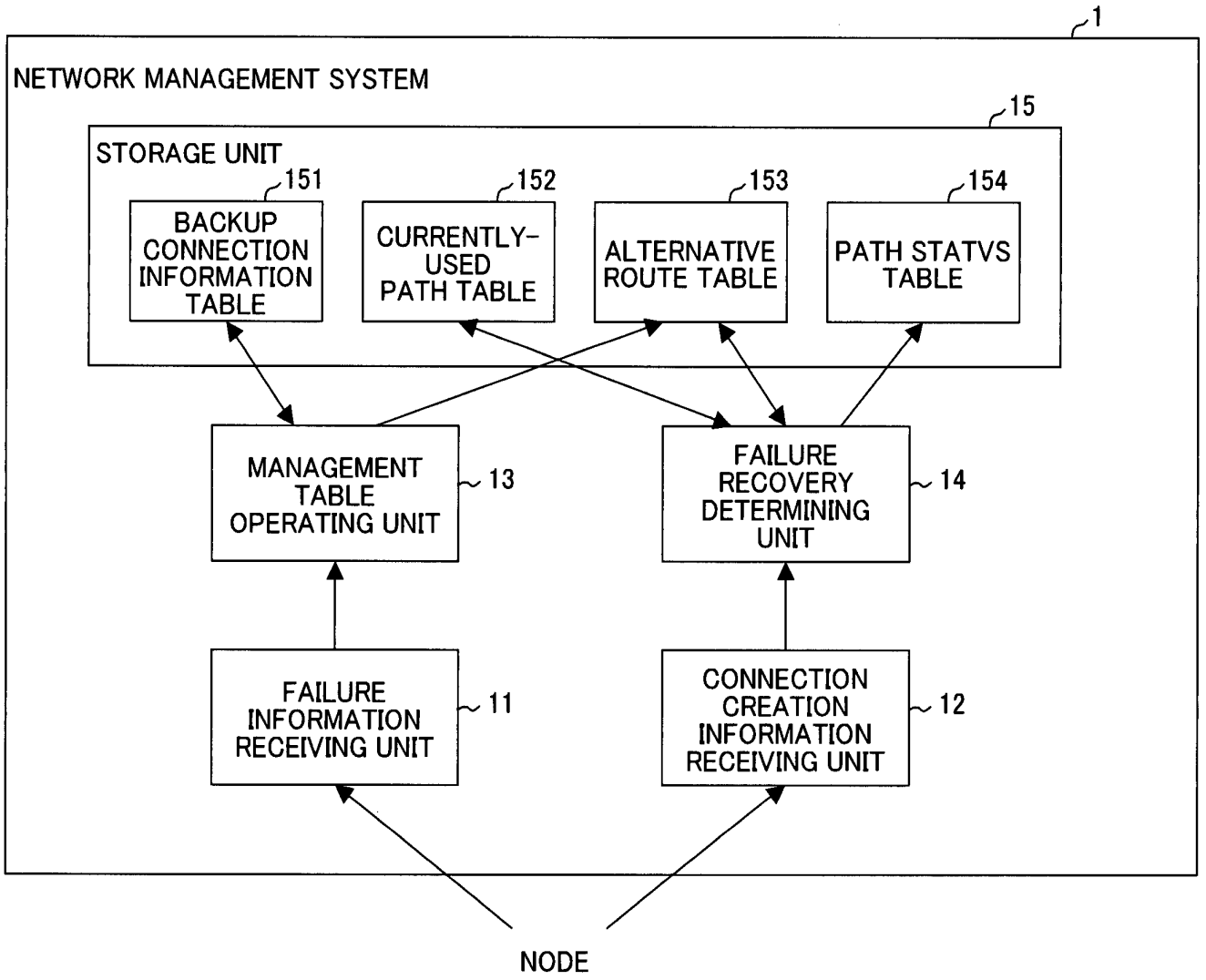
1
NETWORK MANAGEMENT SYSTEM
15
STORAGE UNIT
151
BACKUP CONNECTION INFORMATION TABLE
152
CURRENTLY-USED PATH TABLE
153
ALTERNATIVE ROUTE TABLE
154
PATH STATVS TABLE
MANAGEMENT TABLE OPERATING UNIT
13
FAILURE RECOVERY DETERMINING UNIT
14
FAILURE INFORMATION RECEIVING UNIT
11
CONNECTION CREATION INFORMATION RECEIVING UNIT
12
NODE

FIG. 4

BACKUP CONNECTION INFORMATION TABLE

CURRENTLY-USED PATH	BACKUP CONNECTION INFORMATION
PATH P1	SNC4, SNC5, SNC6, SNC7, SNC8
PATH P2	...
. . .	. . .

FIG. 5

CURRENTLY-USED PATH TABLE

BACKUP CONNECTION INFORMATION	CURRENTLY-USED PATH
SNC4	PATH P1
SNC5	PATH P1, PATH P2, PATH P3
SNC6	PATH P1, PATH P2
. . .	. . .

FIG. 6

ALTERNATIVE ROUTE MANAGEMENT TABLE

CURRENTLY -USED PATH	BACKUP CONNECTION INFORMATION	BACKUP CONNECTION INFORMATION CREATION FLAG	CURRENTLY -USED PATH RECOVERY FLAG
PATH P1	SNC4	0	0
	SNC5	1	
	SNC6	1	
	SNC7	0	
	SNC8	0	
・ ・ ・	・ ・ ・	・ ・ ・	・ ・ ・

FIG. 7

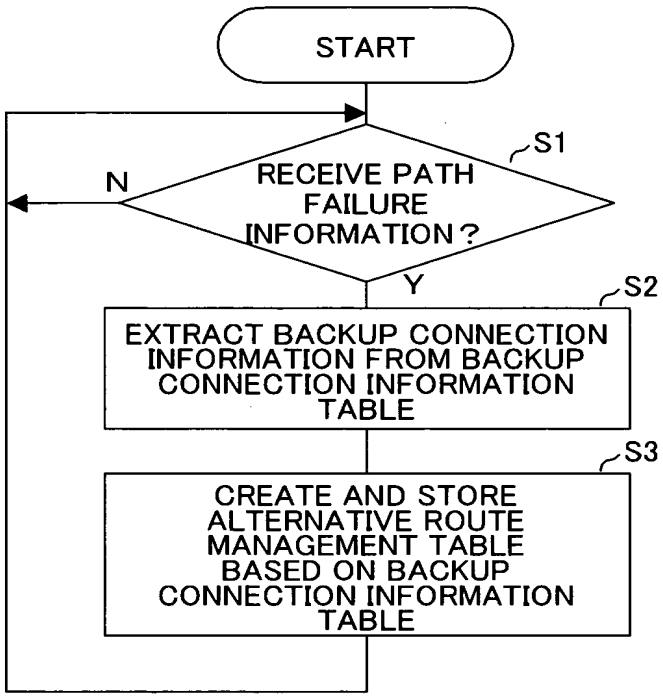
START
S1
RECEIVE PATH FAILURE INFORMATION?
N
Y
S2
EXTRACT BACKUP CONNECTION INFORMATION FROM BACKUP CONNECTION INFORMATION TABLE
S3
CREATE AND STORE ALTERNATIVE ROUTE MANAGEMENT TABLE BASED ON BACKUP CONNECTION INFORMATION TABLE

FIG. 8

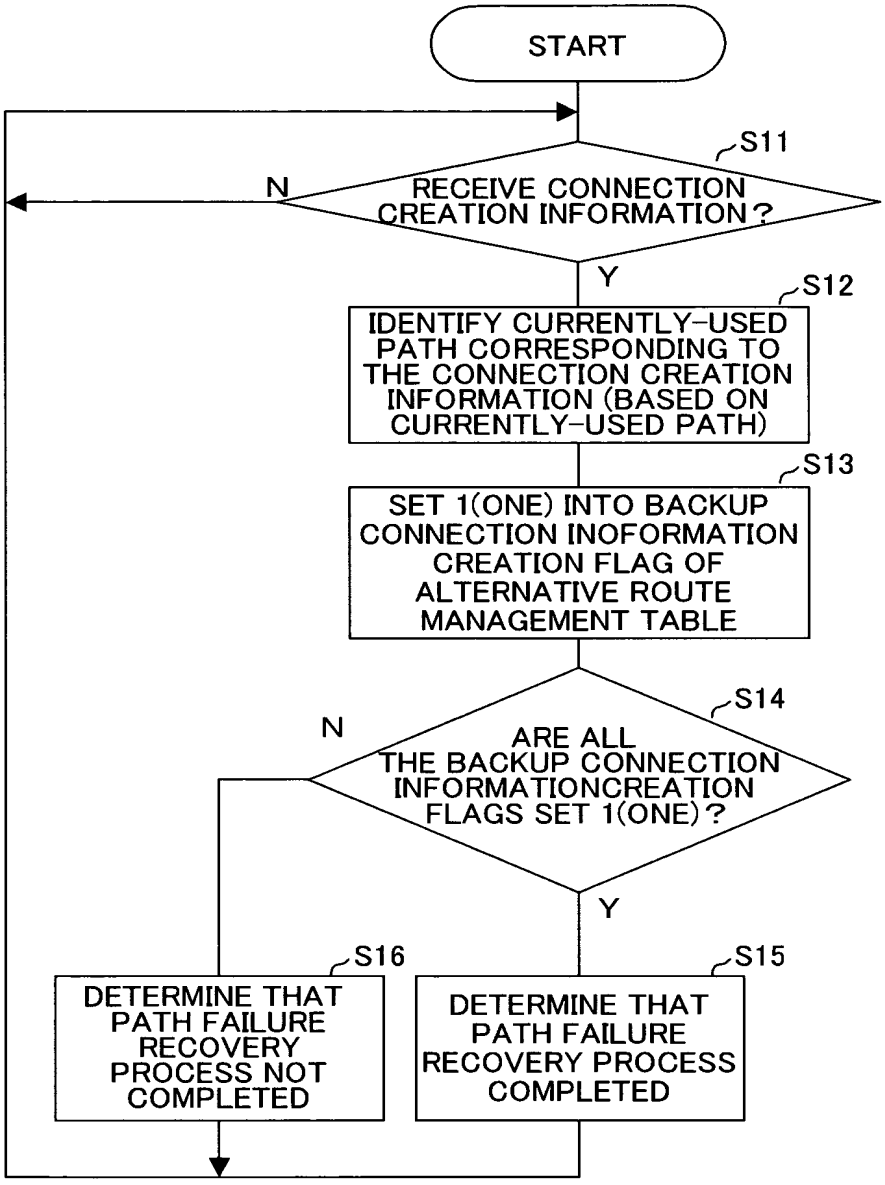
START
S11
RECEIVE CONNECTION CREATION INFORMATION?
N
Y
S12
IDENTIFY CURRENTLY-USED PATH CORRESPONDING TO THE CONNECTION CREATION INFORMATION (BASED ON CURRENTLY-USED PATH)
S13
SET 1(ONE) INTO BACKUP CONNECTION INOFORMATION CREATION FLAG OF ALTERNATIVE ROUTE MANAGEMENT TABLE
S14
ARE ALL THE BACKUP CONNECTION INFORMATIONCREATION FLAGS SET 1(ONE)?
N
Y
S16
DETERMINE THAT PATH FAILURE RECOVERY PROCESS NOT COMPLETED
S15
DETERMINE THAT PATH FAILURE RECOVERY PROCESS COMPLETED

FIG. 9

CREATION CONNECTION INFORMATION MANAGEMENT

CREATION CONNECTION INFORMATION
SNC6
SNC5
. . .

FIG. 10

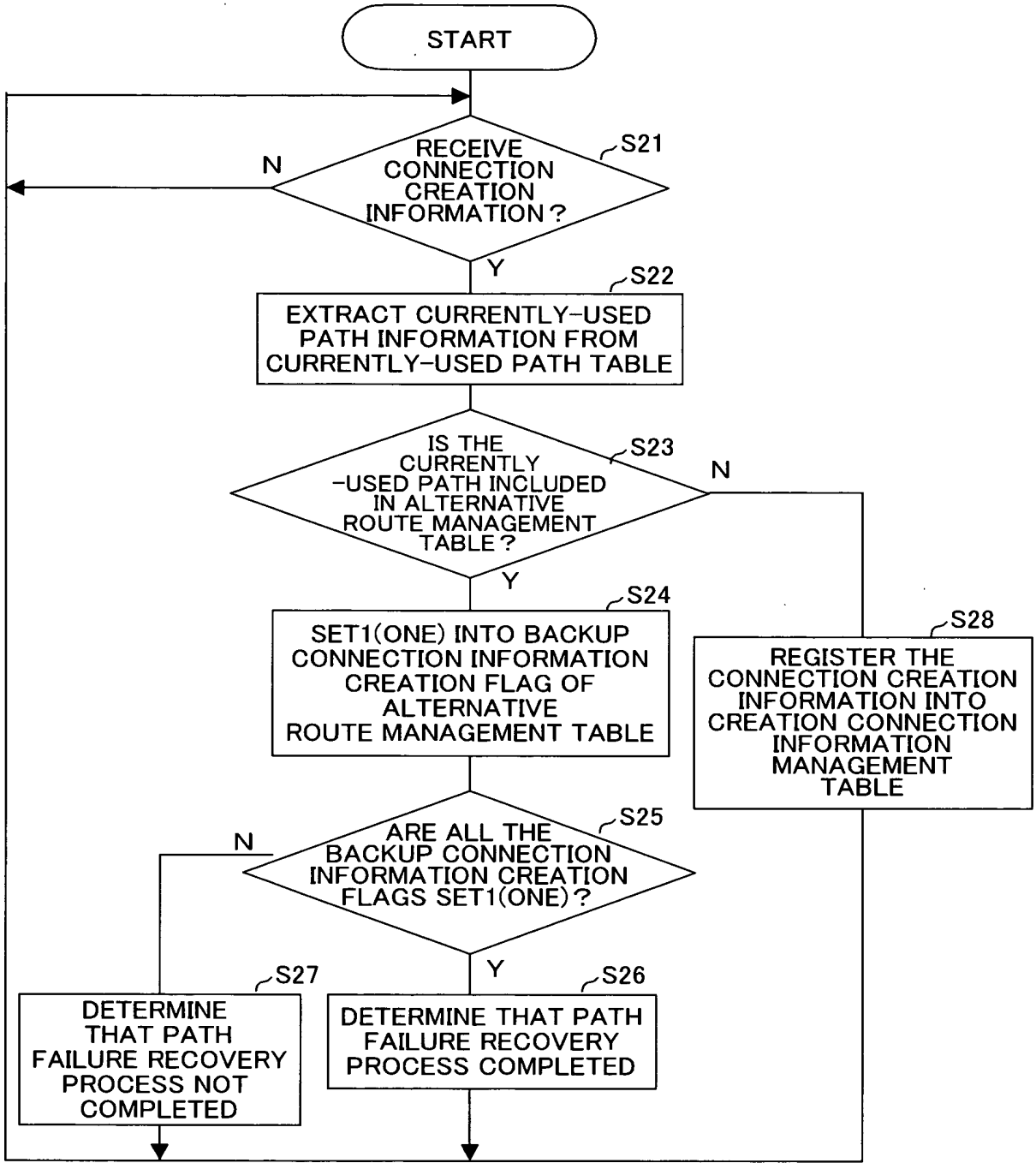
START
RECEIVE CONNECTION CREATION INFORMATION?
S21
N
Y
EXTRACT CURRENTLY-USED PATH INFORMATION FROM CURRENTLY-USED PATH TABLE
S22
IS THE CURRENTLY -USED PATH INCLUDED IN ALTERNATIVE ROUTE MANAGEMENT TABLE?
S23
N
Y
SET1(ONE) INTO BACKUP CONNECTION INFORMATION CREATION FLAG OF ALTERNATIVE ROUTE MANAGEMENT TABLE
S24
REGISTER THE CONNECTION CREATION INFORMATION INTO CREATION CONNECTION INFORMATION MANAGEMENT TABLE
S28
ARE ALL THE BACKUP CONNECTION INFORMATION CREATION FLAGS SET1(ONE)?
S25
N
Y
DETERMINE THAT PATH FAILURE RECOVERY PROCESS NOT COMPLETED
S27
DETERMINE THAT PATH FAILURE RECOVERY PROCESS COMPLETED
S26

FIG. 11

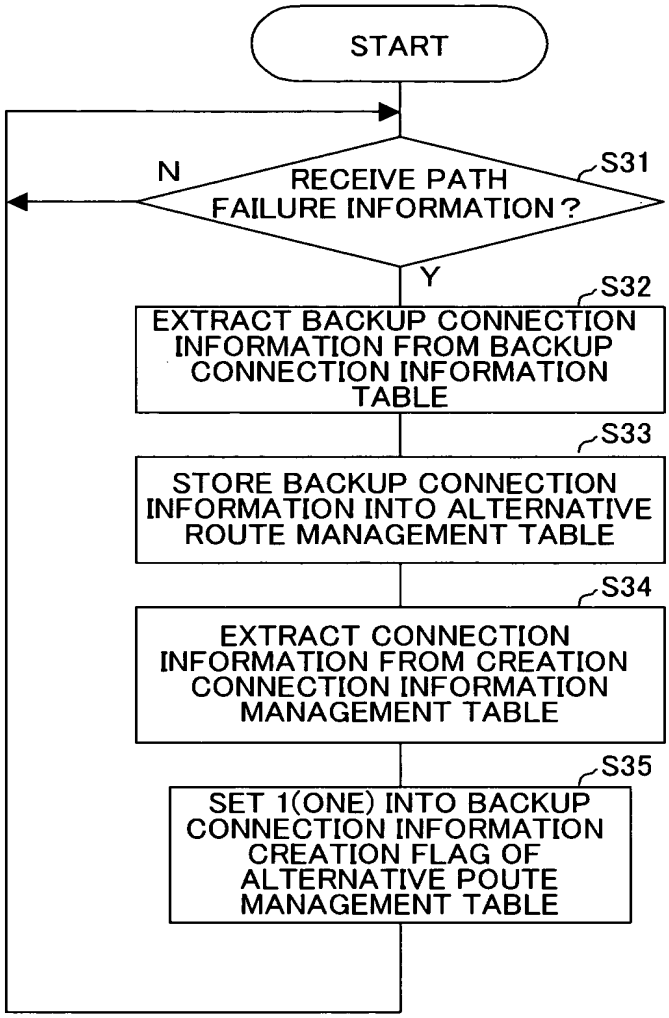
START
RECEIVE PATH FAILURE INFORMATION ?
S31
N
Y
S32
EXTRACT BACKUP CONNECTION INFORMATION FROM BACKUP CONNECTION INFORMATION TABLE
S33
STORE BACKUP CONNECTION INFORMATION INTO ALTERNATIVE ROUTE MANAGEMENT TABLE
S34
EXTRACT CONNECTION INFORMATION FROM CREATION CONNECTION INFORMATION MANAGEMENT TABLE
S35
SET 1(ONE) INTO BACKUP CONNECTION INFORMATION CREATION FLAG OF ALTERNATIVE POUTE MANAGEMENT TABLE

FIG. 12

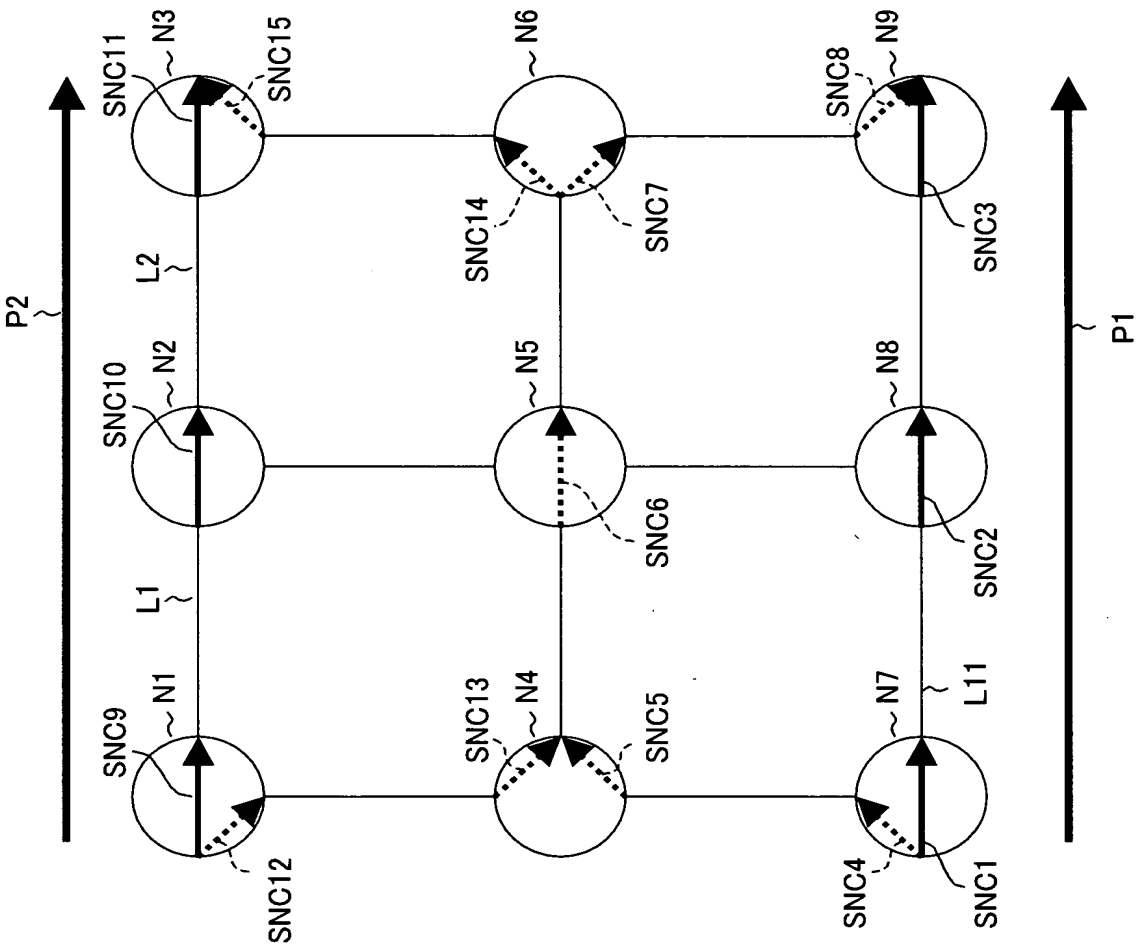
P2
P1
L1
L2
L11
N1
N2
N3
N4
N5
N6
N7
N8
N9
SNC1
SNC2
SNC3
SNC4
SNC5
SNC6
SNC7
SNC8
SNC9
SNC10
SNC11
SNC12
SNC13
SNC14
SNC15

FIG. 13

CURRENTLY-USED PATH TABLE

BACKUP CONNECTION INFORMATION	CURRENTLY-USED PATH
SNC4	PATH P1
SNC5	PATH P1
SNC6	PATH P1, PATH P2
SNC7	PATH P1
SNC8	PATH P1
SNC12	PATH P2
SNC13	PATH P2
SNC14	PATH P2
SNC15	PATH P2
⋮	⋮

FIG. 14

ALTERNATIVE ROUTE MANAGEMENT

CURRENTLY -USED PATH	BACKUP CONNECTION INFORMATION	BACKUP CONNECTION INFORMATION CREATION FLAG	CURRENTLY -USED PATH RECOVERY FLAG
PATH P1	SNC4	0	0
	SNC5	1	
	SNC6	1	
	SNC7	0	
	SNC8	0	
PATH P2	SNC12	0	0
	SNC13	0	
	SNC6	1	
	SNC14	0	
	SNC15	0	
⋮	⋮	⋮	⋮

FIG. 15

OVERLAPPING CONNECTION INFORMATION MANAGEMENT TABLE

CONNECTION CREATION INFORMATION	NUMBER OF RELATED PATHS
SNC4	1
SNC5	1
SNC6	2
SNC7	1
SNC8	1
SNC12	1
SNC13	0
SNC14	0
SNC15	1
・ ・ ・	・ ・ ・

FIG. 16

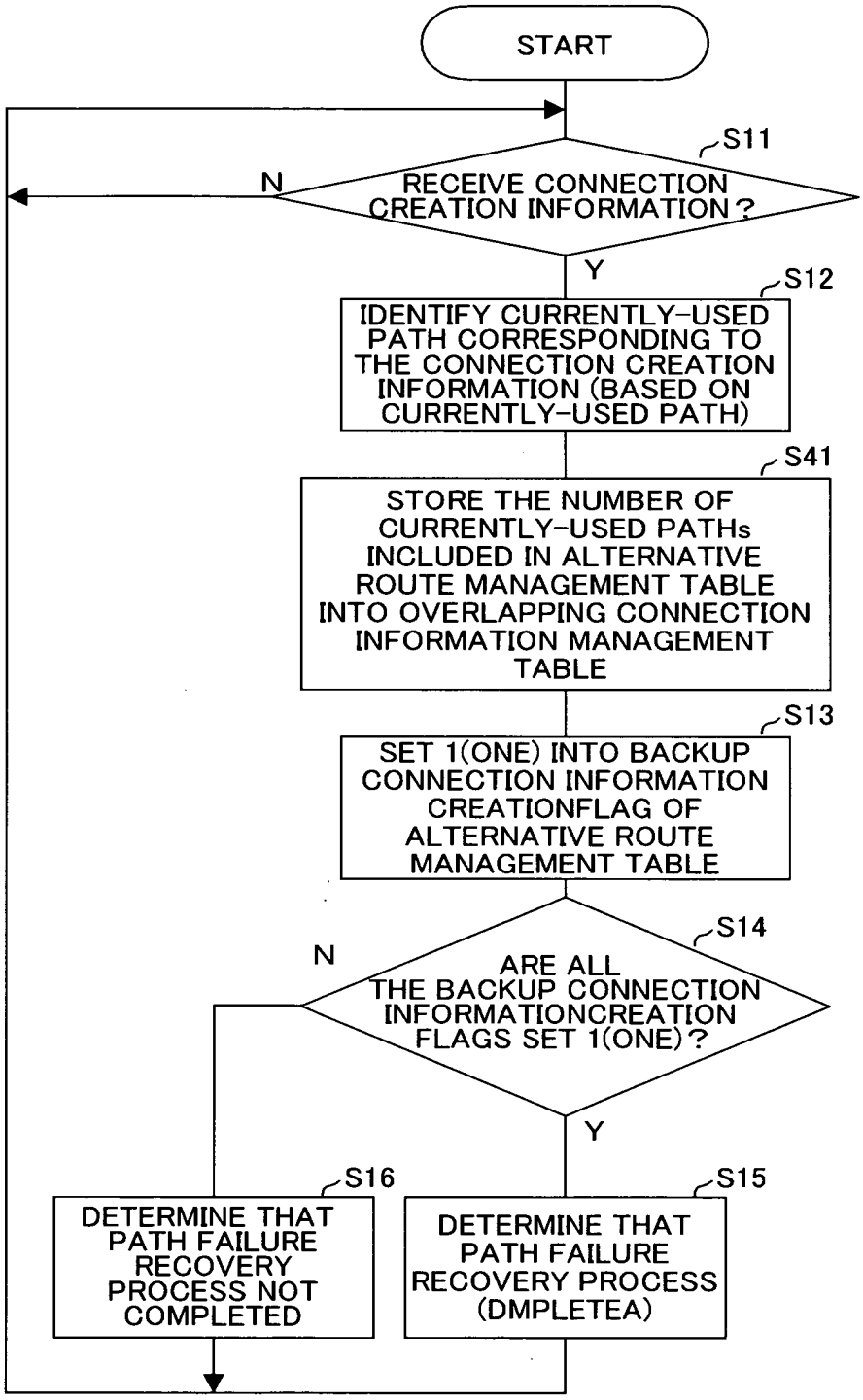
START
S11
RECEIVE CONNECTION CREATION INFORMATION?
N
Y
S12
IDENTIFY CURRENTLY-USED PATH CORRESPONDING TO THE CONNECTION CREATION INFORMATION (BASED ON CURRENTLY-USED PATH)
S41
STORE THE NUMBER OF CURRENTLY-USED PATHs INCLUDED IN ALTERNATIVE ROUTE MANAGEMENT TABLE INTO OVERLAPPING CONNECTION INFORMATION MANAGEMENT TABLE
S13
SET 1(ONE) INTO BACKUP CONNECTION INFORMATION CREATIONFLAG OF ALTERNATIVE ROUTE MANAGEMENT TABLE
S14
ARE ALL THE BACKUP CONNECTION INFORMATIONCREATION FLAGS SET 1(ONE)?
N
Y
S16
DETERMINE THAT PATH FAILURE RECOVERY PROCESS NOT COMPLETED
S15
DETERMINE THAT PATH FAILURE RECOVERY PROCESS (DMPLETEA)

FIG. 17

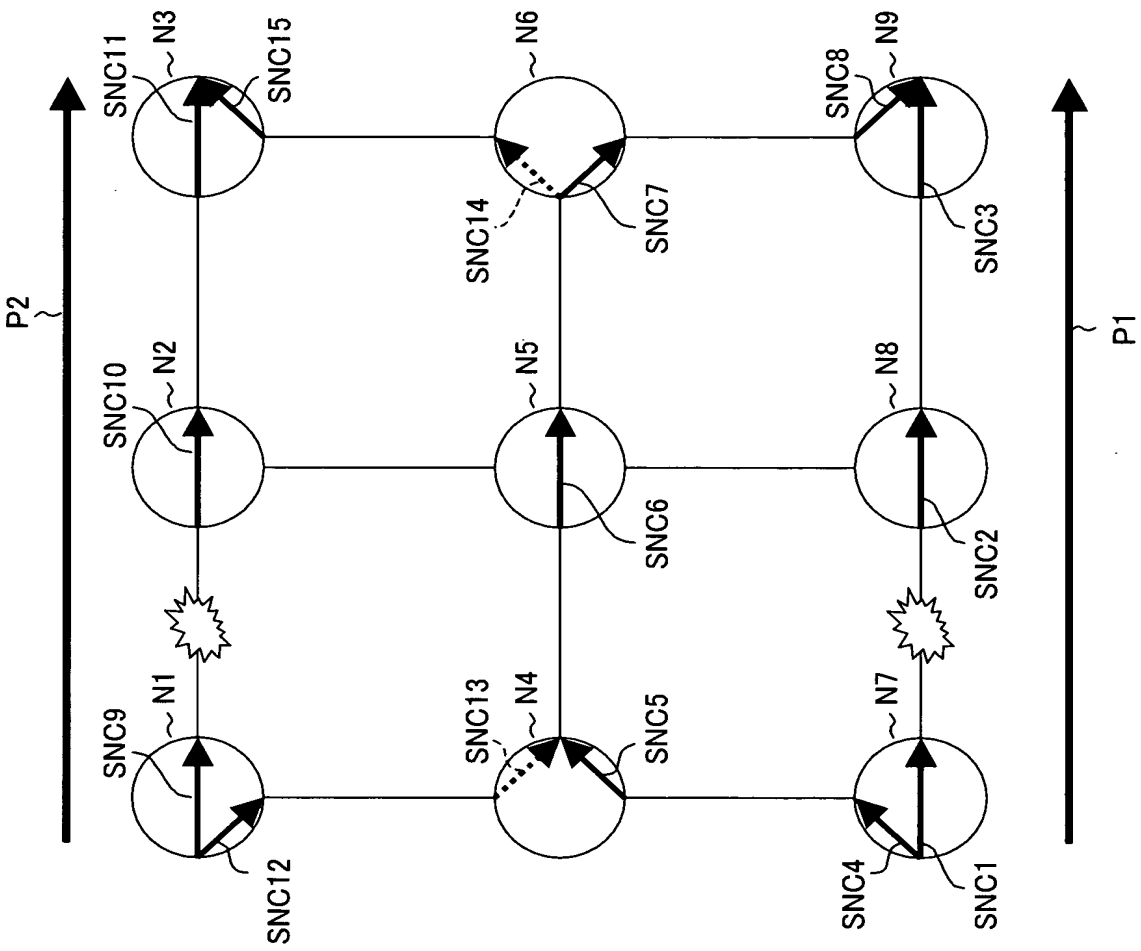
P2
P1
N1
N2
N3
N4
N5
N6
N7
N8
N9
SNC1
SNC2
SNC3
SNC4
SNC5
SNC6
SNC7
SNC8
SNC9
SNC10
SNC11
SNC12
SNC13
SNC14
SNC15

FIG. 18

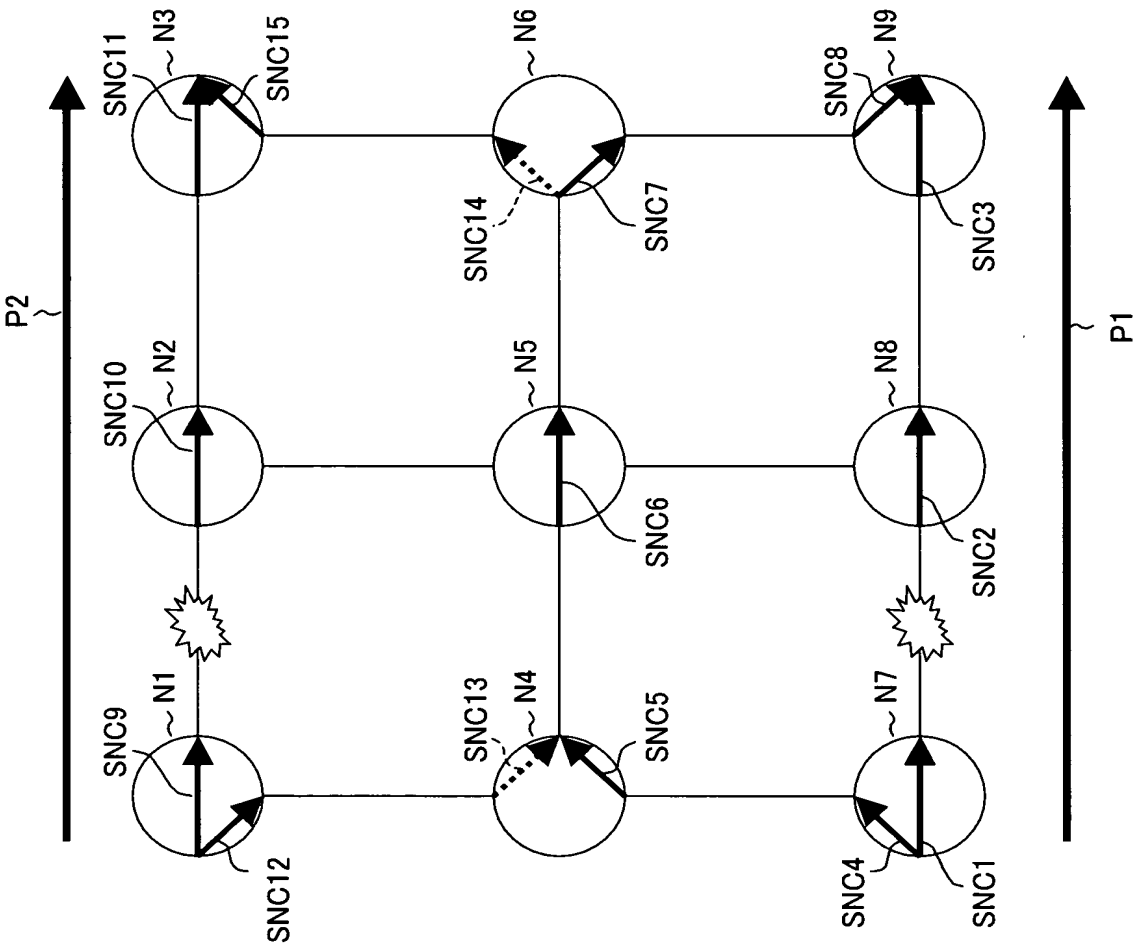
P2
P1
N1
N2
N3
N4
N5
N6
N7
N8
N9
SNC9
SNC10
SNC11
SNC12
SNC13
SNC14
SNC15
SNC5
SNC6
SNC7
SNC4
SNC8
SNC1
SNC2
SNC3

FIG. 19

OVERLAPPING CONNECTION MANAGEMENT TABLE

CONNECTION CREATION INFORMATION	NUMBER OF RELATED PATHS
SNC4	1→0
SNC5	1→0
SNC6	2→1
SNC7	1→0
SNC8	1→0
SNC12	1
SNC13	0
SNC14	0
SNC15	1
・ ・ ・	・ ・ ・